The Maple Sugar Industry

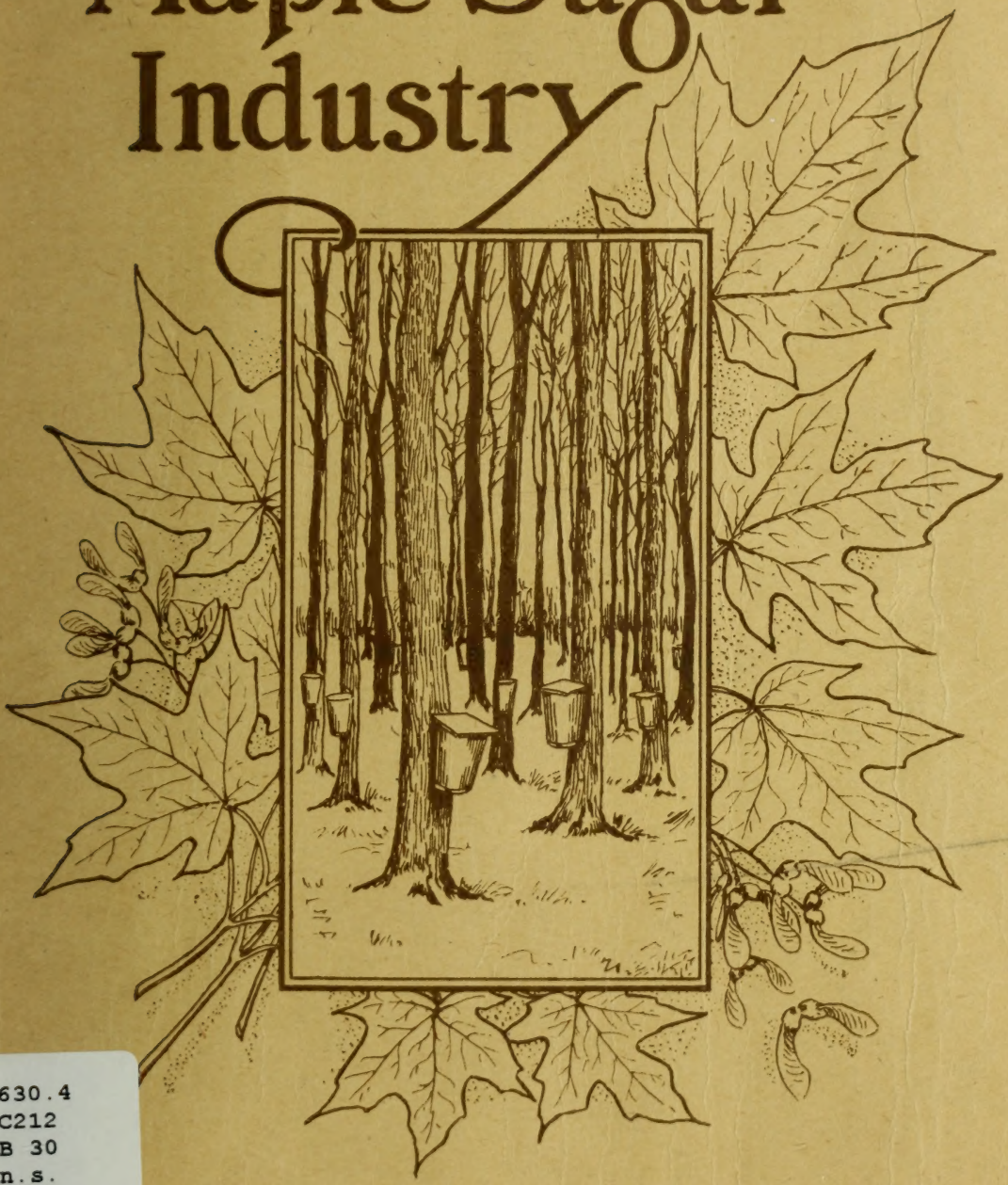

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FIG. 1. MAPLE SYRUP
Grades Nos. 1, 2, 3 and 4.

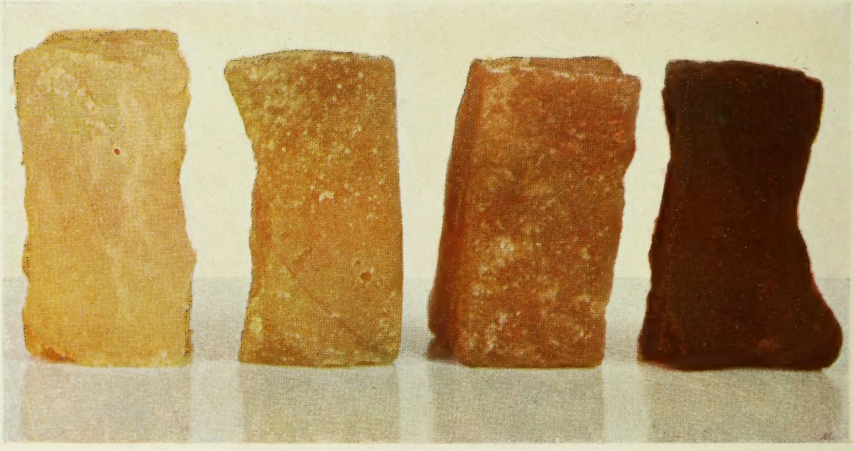

FIG. 2. MAPLE SUGAR
Grades Nos. 1, 2, 3 and 4.

The finest grades of syrup and sugar, represented in the lighter colours, possess corresponding delicacy of flavour. No. 1 syrup should resemble in appearance the first grade of clover honey, while grade No. 4 would correspond quite closely with honey produced from the buckwheat plant. The flavour of the two grades varies accordingly. Syrup and sugar of the highest grade are produced from clean, fresh sap quickly boiled in a clean evaporator. The lower grades are the result of faulty manipulation frequently including scorching or the use of a burned pan.

The Maple Sugar Industry in Canada

(*Third Edition*)

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THE MAPLE SUGAR INDUSTRY IN CANADA

Its History and Progress

The making of maple sugar and syrup has become but a memory in the recollection of residents in many of the older parts of Canada, where even the woodlots have given up their places to cultivated fields. The industry is still, however, an important one over large areas in Quebec and to a less extent in Ontario and the provinces down by the sea.

Sugar making from the maple, which is confined entirely to this continent, had a very early beginning. Before the advent of the white man the Indian had learned to extract and concentrate the sap of the maple tree. On the approach of spring the trees were gashed, with the tomahawk, in a slanting direction and beneath the opening made was inserted a wooden chip or spout to direct the fluid drop by drop into the receptacle resting on the ground. The sap was caught in a birch bark dish and boiled in earthen kettles. The small quantity of dark, thick syrup thus made was the only sugar available to the Indians and is stated by early writers to have been highly prized.

The early settlers from the Old Land learned from the Indians the art of sugar making and indeed followed for many years their crude methods of manufacture. Even yet primitive equipment and methods are stated to be used in back sections of the country that turn out their annual crop of dark, inferior syrup and sugar.

For perhaps a century the white man followed very closely the primitive methods of the Indian save for the substitution of iron or copper kettles for vessels of clay or bark. In the early days before the timber acquired much value the axe continued to be used for tapping the trees, the sap was caught in wooden troughs and conveyed in buckets on the shoulders with a sap yoke to a central point to be boiled. No sugar bush was fully equipped without snowshoes, which were frequently found necessary in gathering the sap. The boiling was done in large iron kettles suspended from a pole in the open woods in a sheltered location, with no protection from the sun, rain, or snow or the ashes, falling leaves, moss, and bits of bark that were driven about by the wind.

The maple products made by this crude method were strong in flavour, dark in colour, and variable in quantity.

Until about fifty years ago there was little improvement made in the methods of sugar makers; but since that time the advance has kept pace with that in other branches of agriculture, until it has become a more or less highly organized commercial industry.

An early improvement was the substitution of the auger for the axe in tapping, coopered buckets took the place of the birch bark " caso " or hewn sap trough, while the kettle gave way to the evaporating pan which has in later years developed into the modern evaporator with corrugated bottom and separate compartments. Not alone for the conservation of the life of the tree but also for cleanliness in sugar making the wooden spout has almost disappeared in the most advanced sections, in fact the tendency now is toward the use of metal in every article of equipment with which the sap, syrup, or sugar comes in contact. Furthermore the increasing cost of

labour is being met by the ingenious inventor who has provided facilities for taking full advantage of the law of gravitation in handling the fluid, which in a well equipped plant flows of its own accord from the collecting

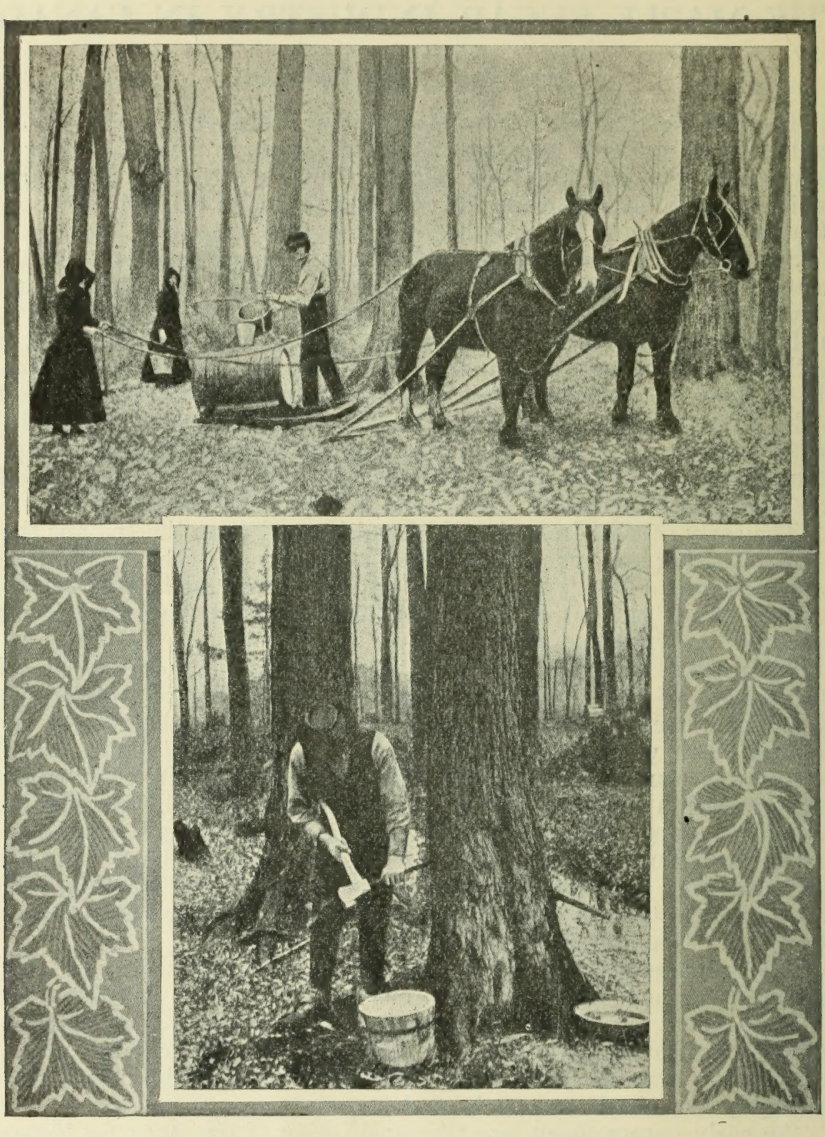

FIG. 3. SCENES IN THE EARLY DAYS OF SUGAR MAKING

The women lent a willing hand while the season was on. In the lower picture the "old-timer" is seen tapping with the gouge and wooden spile.

tank to the storage vat, from thence to the evaporator and when boiled to a proper consistency, into the receiving can. Indeed where the profile of the sugar orchard will permit of it pipe lines are laid to conduct the sap from outlying collecting centres to the camps where evaporation takes place.

With all the advances that have taken place in manipulation, sugar making has not lost its romantic side. "Sugaring off" at the sugar camps in the woods is still looked forward to by young and old, who regard the event as a social feature affording rare enjoyment. The tramp to the woods on a spring day, the aroma of the escaping steam, the partaking from a wooden paddle by means of a chip-like scoop the hot syrup just on the verge of solidifying into sugar, or the tasting of the "wax" that has been allowed

FIG. 4. ANTIQUATED SYSTEMS OF BOILING STILL IN USE IN BACKWARD SECTIONS

to harden on the clean snow, all serve to inspire the reminiscent story teller and to awaken the amorous instincts of the budding youths. Such was the sugaring off of decades ago and such it is to-day where sugar orchards are operated for from two to four weeks in the spring in certain sections, year after year.

EXTENT AND IMPORTANCE

The importance of the maple sugar industry is scarcely realized in many parts of Canada where it has long since ceased to be carried on. From 1850 to 1890, according to Dominion statistics, the production of maple sugar, together with its equivalent in syrup, increased year by year, but since that time it has steadily fallen. The average yearly production from 1851 to 1861 was about 13,500,000 pounds; from 1861 to 1871, about 17,500,000 pounds; from 1871 to 1881, 19,000,000 pounds; from 1881 to 1891, an average of 22,500,000 pounds was reached. During the next decade the yearly average fell to some 21,200,000 pounds, while in more recent years it has dropped to little less than 20,000,000 pounds. Even

though a decrease in production is being experienced the industry still bulks large and with the more general use of modern methods and proper encouragement there is no reason why it should not return to and even surpass the high figures of the eighties.

The industry is confined in Canada to Quebec, Ontario, New Brunswick, and Nova Scotia. In the Maritime Provinces the yearly output has rarely exceeded half a million pounds, Quebec turns out about 14,300,000 pounds, and Ontario 5,000,000 pounds per year.

It is estimated that this vast industry, representing an annual valuation of almost two million dollars, is carried on by about 50,000 growers. While many of these operate their larger or smaller woodlots preserved upon their good farms, a vastly larger number take their sap from rough and stony areas that would have comparatively little value if the trees were removed. The increasing value of maple wood and the comparatively low price of maple sugar and syrup which prevailed until war conditions greatly increased the price of all sugar, has led in recent years to the removal of many fine sugar orchards that had produced crops of deliciousness yearly for more than half a century. It is regrettable that sturdy kings of the forest have been cleared off in this way as an important yearly revenue at a season when badly needed has been cut off and one which is secured by the labour of a few weeks when it can best be spared from service on the farm. The conservation of the maple groves will, therefore, appeal to every one interested in the forest and the farm.

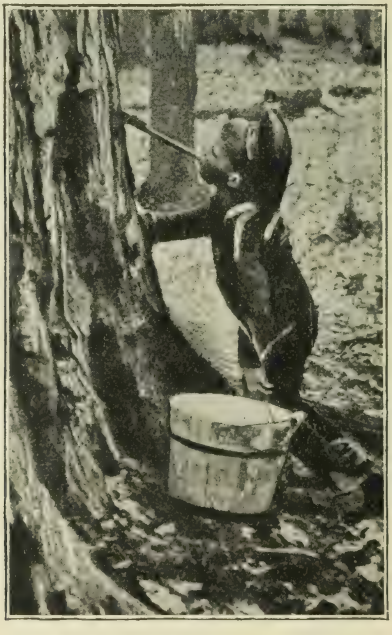

FIG. 5. A JOY OF SPRING

THE SUGAR FARM

The Grove

On many farms the sugar bush is simply the woodlot that has been preserved to supply fuel for the household, to afford a bit of beauty and shelter in the midst of a wind-swept country, and to provide an annual crop of sugar and syrup to be used as a delicacy or sold to regular customers at a high price. Such bushes usually contain trees of several varieties, but the maples are the last to be taken. These are usually to be found on high-priced farming land where as a rule one is apt to grudge the land occupied by the trees, which in many cases would scarcely be saved were it not for the annual spring harvest.

It is not from these small mixed groves that the great marketable supply is secured but rather from the more rugged areas where the plough and the harvester are not so easily operated. The groves as found in the

Fig. 6. Sap Gatherers Making the Morning Round
Sap conveyed to the sugar house by metal pipes.

principal sugar counties are chiefly maple trees, the other kinds having been removed for fuel or the saw. This is the condition that obtains in many of the settled counties of Eastern Ontario and of Quebec, where the same groves and in many cases the same trees have been tapped by several generations. In more northerly parts of these provinces there are vast stretches of chiefly hard maple forest in a primeval state awaiting the sugar maker with his modern equipment.

In a tour among sugar makers in the Eastern Townships of Quebec it was observed that the average maple grove contains from 50 to 100 tapped

trees per acre. The ideal grove would perhaps contain a somewhat larger number. It should be sufficient to give a maximum yield of sap per acre.

The production of sap of a sugar-making quality depends on a large leaf area. From this it follows that the number of trees per acre must be consistent with the greatest crown development of each tree in the grove. A maple tree, which is a forest species, growing under this condition will produce a good length of trunk and this is necessary to a productive yield, because the elaborated sugar is stored in the trunk of the tree for use during the next season; thus the trunk becomes a storage tank. The typical tree for sugar making is a tree with an ample root system to furnish an abundant supply of crude sap; a broad, spreading top with big leaf surface to elaborate the sap and a big, long body in which the sap may be stored.

In order that an extensive leaf surface may be maintained in an active condition the soil must be protected against too great loss of moisture during the summer months. The soil must be rich, cool, and moist and these conditions must be maintained from year to year. The root system of the maple is shallow, many of the fine root hairs rising nearly to the

Fig. 7. Through Metal Pipes the Sap Flows from the Bush to the Sugar House

surface to absorb moisture. If these are injured either by exposure or drought or by the grazing and tramping of animals the tree cannot do its best. For this reason pasturing by farm stock should not be permitted year after year. While the truth of this assertion is generally admitted among sugar makers it is contended by many of them that in order to subdue a too rampant growth of underbrush cattle may be very well allowed to browse the grove about one year in five or six. Unless this is done, or hand thinning is resorted to, the growth becomes so dense and strong that much waste and difficulty is experienced in gathering the sap. It should be borne in mind, however, that for the vigour of the grove as well as a full

flow of sap year by year it is desirable to maintain forest conditions which include a constant renewal of young trees and a surface kept heavily matted with leaves and humus.

A sugar grove like any other orchard requires some attention to keep it in good condition. Apart from the maintaining of roadways to facilitate the collecting of sap, thinning out may be necessary from time to time. In a usual mixture the trees of species other than maple may be gradually removed and the reproduction of the maple encouraged. In making such a thinning the work should be done gradually, the trees which crowd the best maples being taken out first, a few trees from a place at a time, so as not to suddenly expose the large maples to danger from wind storms. If the maples themselves stand too thickly those with small crowns or unsoundness should be removed. In their places the promising maple saplings should be given every chance to develop.

Old groves that have been worked for generations are likely to contain a number of overmature trees that have passed the time of yielding good flows. Unless some attention has been paid to replacing these the sugar orchard is losing ground, more especially if the land be in sod and is grazed by stock. To renew such a grove it is better to bring about a reproduction than to plant a new stand. To accomplish this stock must be excluded, soon after which thousands of maple seedlings will be noticed coming up. While these are quite young roadways for sap gathering should be laid out and made smooth. Unsound maples and seedlings and saplings of other sorts ought to be removed. In a few years the strongest of saplings will assert themselves and these should be encouraged by lopping off the tops of the weaker ones. When the preserved saplings have reached a height of 9 or 10 feet cattle may be let in to overcome the younger brush, which if left would soon make it difficult to collect the sap.

In all this work one has to exercise judgment, having in view a highly productive sugar orchard ever increasing in value from the standpoint of the timber alone. Maple lumber has long been a valuable commodity that has doubled in price within little more than a decade. It is only reasonable to expect that ten years hence will see it much more valuable than at the present time. For this reason reforesting with maple should prove a very remunerative enterprise, yielding in a few years an annual crop of sugar and a heritage in timber of no mean value.

Unfortunately the stripping of even our rocky lands of their trees has gone on to an unprofitable degree. A maple tree that will cut two cords of wood is worth on the stump for that purpose about ten dollars at the present price of wood and lumber. The annual interest on this sum is from 60 to 70 cents. The tree, if left to grow into considerable value for itself, will yield an average of three pounds of sugar, worth anywhere from 75 cents to $1, according to the intelligence of the maker. To clear off the maple timber from stony land unsuitable for farming purposes is like killing the goose that lays the golden egg. It should not and would not be a crime to cut mature trees; but the sin lies in not allowing others to grow. Reforesting with maple is undoubtedly as important as with pine or spruce. In view of the returns to be expected from each of these kinds of timber there can be no doubt of the real economy of not only conserving the maples on rough lands but also in taking action to reclothe those rugged districts that have been made utterly barren by the loss of the forest.

THE SUGAR-MAKING PLANT

Sloping ground in a dry part of the grove near a spring should be chosen for the sugar house. The house represented by the plans shown on pages 13 and 14 is suitable for taking care of the output of a grove of three or four thousand trees. A convenient arrangement is provided for equipment including the location of a storage tank, evaporator and wood storage.

The sugar house of a modern plant is not only for making and putting up the products but also for storing buckets, pails, spouts and other equipment from one spring to another. What appeared to be the best sugar house visited in the Eastern Townships was constructed to take care of the flow of about one thousand trees. It is 42 feet long and 30 feet wide. The walls were built of house siding and painted; the floor is of cement and the roof of shingled wood. It has a lean-to 12 feet wide on the east side

Fig. 8. A Gathering Tank Discharging its Load of Sap at the Sugar House

for storing wood and a small compartment at the north end for protecting the storage tank. It is built on sloping ground so that the gathering tank empties by gravitation into the storage tank and from there into the evaporator. Where the location is level or nearly so it is the usual custom to build an elevation on which the hauling sled may rest while the collected sap is flowing out to the sap holder. Other sugar houses have metal roofs, which are safer from a fire hazard standpoint, but these are apt to drip during boiling, which is not only unpleasant for the worker but tends to colour the sap in the elevator. On this account a shingled roof is preferred. It is well to have the walls fairly tight and ventilators of large capacity, the full size of the evaporator, to allow the steam to escape freely. It is well understood that the warmer the house the better the ventilation.

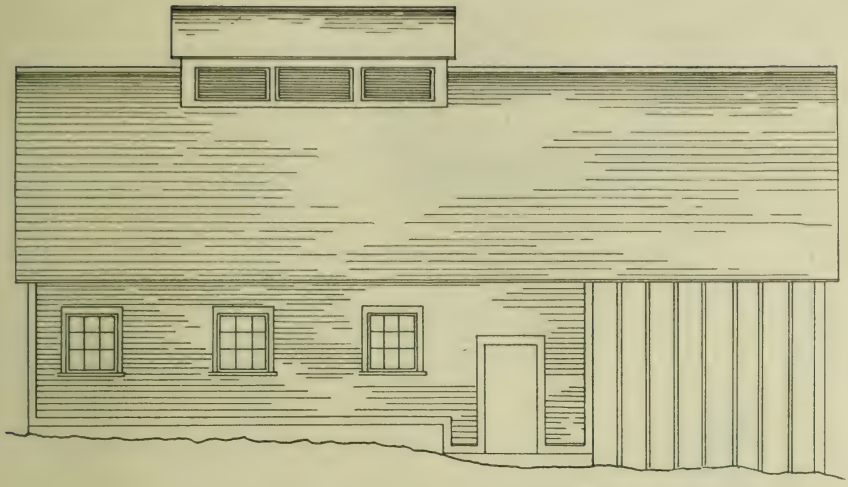

FIG. 9. SIDE ELEVATION OF SUGAR HOUSE

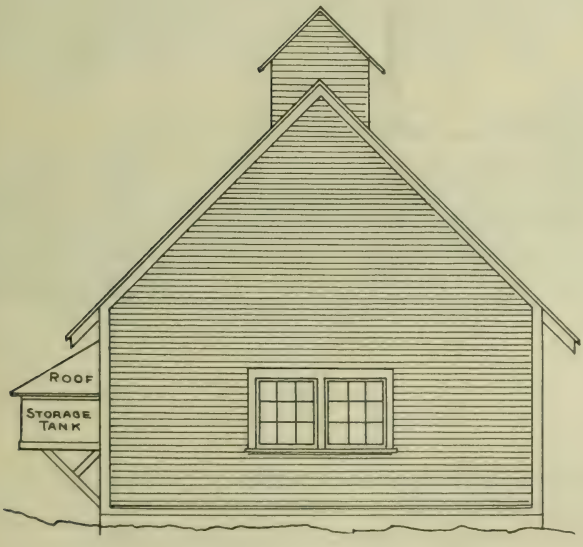

FIG. 10. END ELEVATION OF SUGAR HOUSE

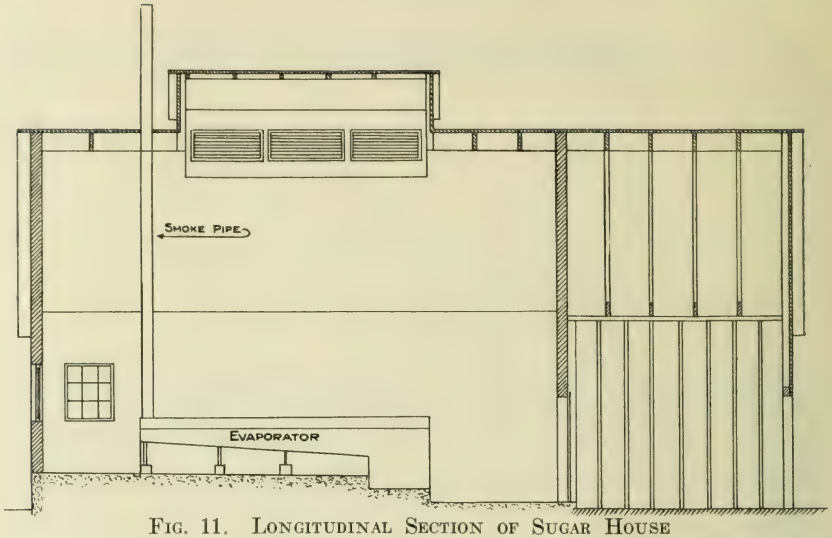

FIG. 11. LONGITUDINAL SECTION OF SUGAR HOUSE

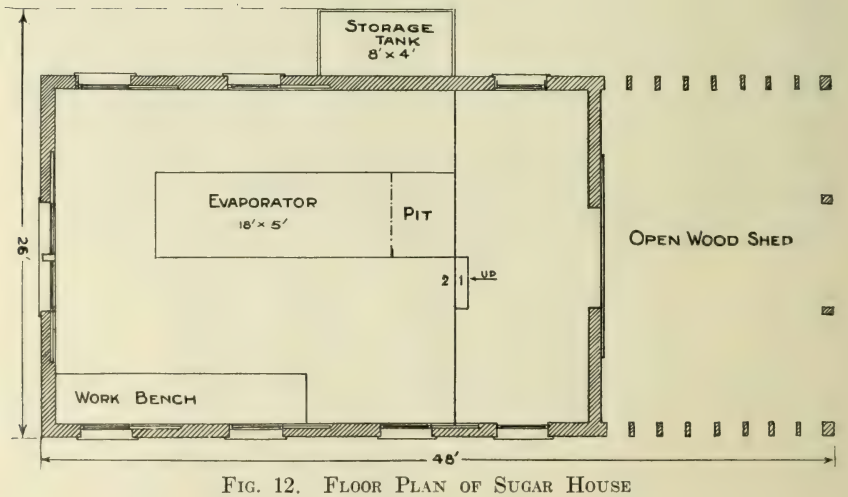

FIG. 12. FLOOR PLAN OF SUGAR HOUSE

A cold sugar house is generally filled with steam while in operation. The house should be well lighted. A brick or metal smokestack should extend well above the roof to assure good draft, as hot fires are necessary to good work. If the floor is not wholly of cement it is well for protection from fire to use cement or brick pavement in front of the fire doors. A drain leading away from the building should be provided to carry off weather water and washings.

The building of the sugar house should be finished during the summer or early autumn so that the furnace or arch may be placed on its foundation before the ground is frozen. The equipping, including the storing of a supply of fuel, should also be concluded before winter sets in.

The Evaporator

It has been a long stride from the iron kettle, used in sugar making by our forefathers, to the modern evaporator that is necessary for the making of a high-class product. In pioneer days the saving of fuel had not to be

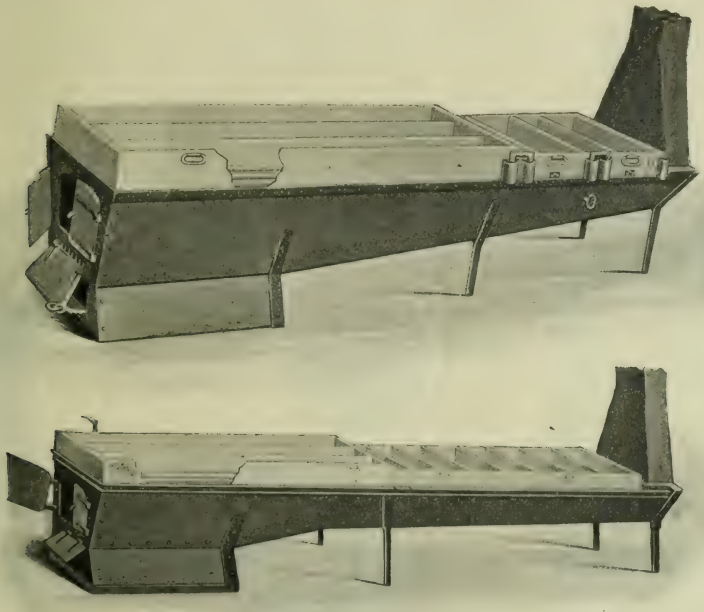

Fig. 13. Types of Modern Evaporators.
All have corrugated bottoms.

considered nor was quality of product a live issue. Most settlers had kettles for the making of potash, which in many districts was the only crop for which money could be exchanged. These large iron basin-like vessels served for many years to boil down the sap, and because only dark and strong-flavoured goods could be made in these, it has taken a long time for the public to recognize the superiority of the lighter, cleaner, milder sugar turned out by the modern evaporator.

An advance on the old kettle was the flat-bottomed sheet-iron pan, 2 to 3 feet wide and 4 to 6 feet long, built over a brick or stone fireplace. Some of these pans are still in use in back districts that have never looked for more than a low price for their inferior products.

The modern evaporator is designed for rapid evaporation and economy of fuel. There are several makes in use, but all are similar in prin-

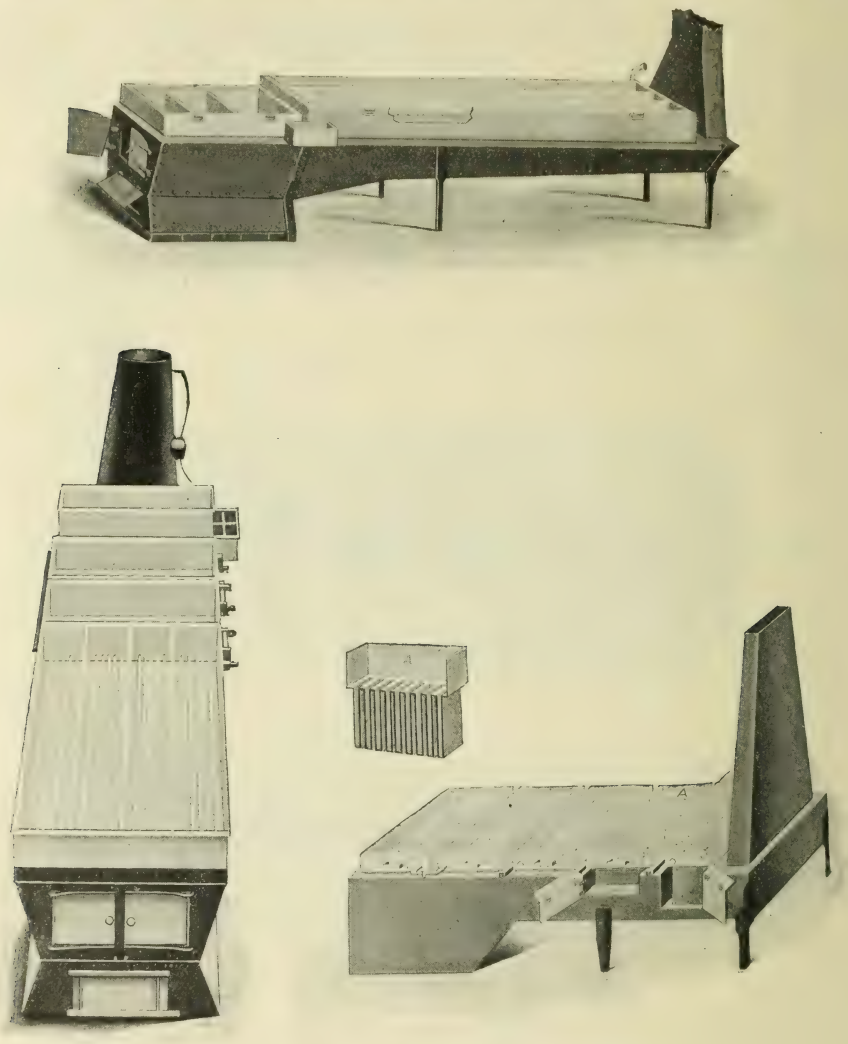

FIG. 14. TYPES OF MODERN EVAPORATORS.
All have corrugated bottoms.

ciple. It consists of a heavily-tinned pan, strongly made, set on an arch, which usually has a regular stove front with large doors for firing. The pans have corrugated bottoms and are partitioned off to give a zig zag course to the sap. It is important that it be set quite level so as to maintain a uniform depth of sap. Most of them are equipped with a float feed which

allows the fresh sap to flow in as rapidly as the water evaporates. The sap enters at one corner usually at the front and by a zig zag course flows from 80 to 100 feet before reaching the outlet at the other end. The sap thickens as it flows and has to remain in the last compartment only a very brief time before it has reached the consistency of syrup. From here it is drawn off at frequent intervals.

When purchasing an evaporator it is important to provide for expansion of the plant and the taking care of heavy runs of sap. An experienced maker believes in providing ten square feet of boiling surface for every one hundred trees tapped.

For reducing syrup to sugar an additional evaporator is necessary. This is a simple pan 2 to 2½ feet wide by 3 to 6 feet long and about 1 foot deep. The metal is usually of heavy tin or in some cases galvanized iron, but never of sheet iron. This pan sits over an arch or firebox. It has convenient handles for lifting it off the fire when the syrup has reached the proper consistency to crystallize. Some makers use a block and tackle for raising this pan from the fire. This is necessary where one man has to do the work alone.

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OPERATING THE PLANT

The Sap

Sap as it comes from the maple tree is a very dilute solution containing from 95 to 98 per cent of water, about 3 per cent of sugar, and small quantities of mineral constituents. The making of maple syrup or sugar consists primarily in getting rid of the surplus water which, as all sugar makers know, is by evaporation. Early sugar makers used very crude utensils and methods and made as a rule correspondingly inferior products as compared with the high-class goods made on the well-equipped and well-managed sugar places of the present day. The modern sugar maker recognizes that sap, like milk, is a very perishable product, being an

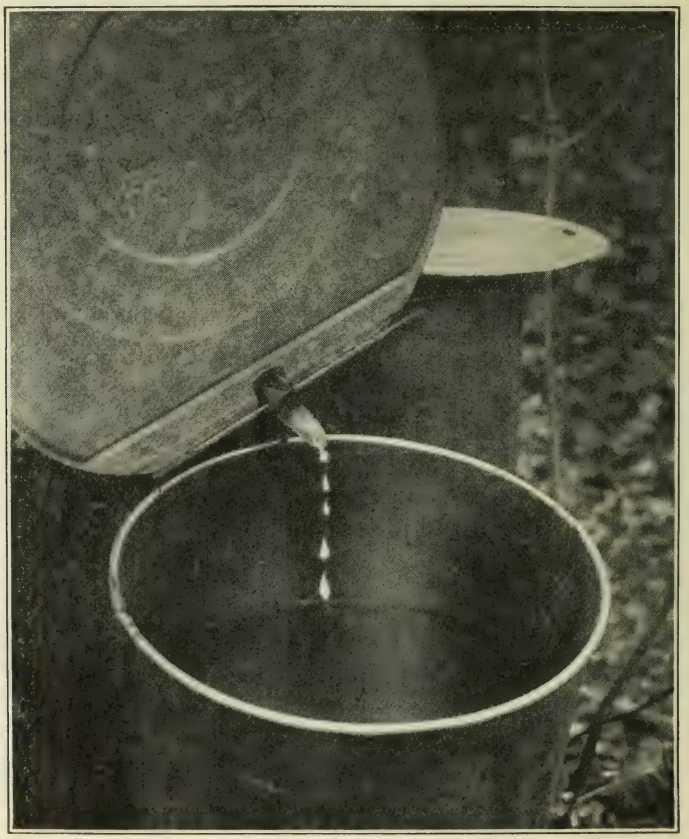

Fig. 15. The Flow of Sap from the Tree

excellent medium for the development of fermentive organisms. To make a good sugar or syrup it is necessary, therefore, to have an equipment which will allow for the least possible contamination of the product in all stages of manufacture. Not only must thorough cleanliness be observed but transformation of the new sap to the finished product must be direct and speedy.

In a paper on tree surgery read at the nineteenth annual meeting of the Vermont Maple Sugar Makers' Association, Mr. C. O. Ormsbee described the physiological process of sap elaboration. He said:—

"Moisture in the soil dissolves and holds in solution certain mineral elements. This moisture so charged finds its way into the roots of the trees and then into the wood in which it ascends to the leaves, through which it passes and from which a very large proportion is evaporated, or transpired according to the term employed. It is known that a very large tree bearing a big top transpires many tons of water in a season. From the time the moisture enters the roots until it passes through the leaves it is termed crude sap. But air charged with carbonic acid gas also passes through the leaves, and meeting with the crude sap yields to it the carbonic acid and emerges as pure air, while the crude sap with its load of carbon becomes transformed into what is known as elaborated sap. In this form it finds its way back into the body of the tree where it is conveyed in the wood, here and there wherever needed to the inner layer of the bark, which

Fig. 16. A Modern Gathering Tank ready to be emptied at the Sugar House

is called the cambium, and where it is transformed into the wood which forms the season's growth. The greater part of this sap, however, and perhaps all of it, is this elaborated sap that we use in making syrup and sugar from the maple tree, and tar and turpentine from the pine tree."

Sap will flow during favourable weather anytime after the leaves have fallen in the autumn, but even though a warm spell should occur during the autumn or winter no experienced sugar maker thinks of tapping his trees. The proper time to tap varies from year to year and in different latitudes. In Canada it seldom commences before March, and is not often delayed beyond the first of April. It should be done when indications point to warm, sunny days and frosty nights. A sugar maker living in the Eastern Townships of Quebec kept a record of tapping dates since 1884. During

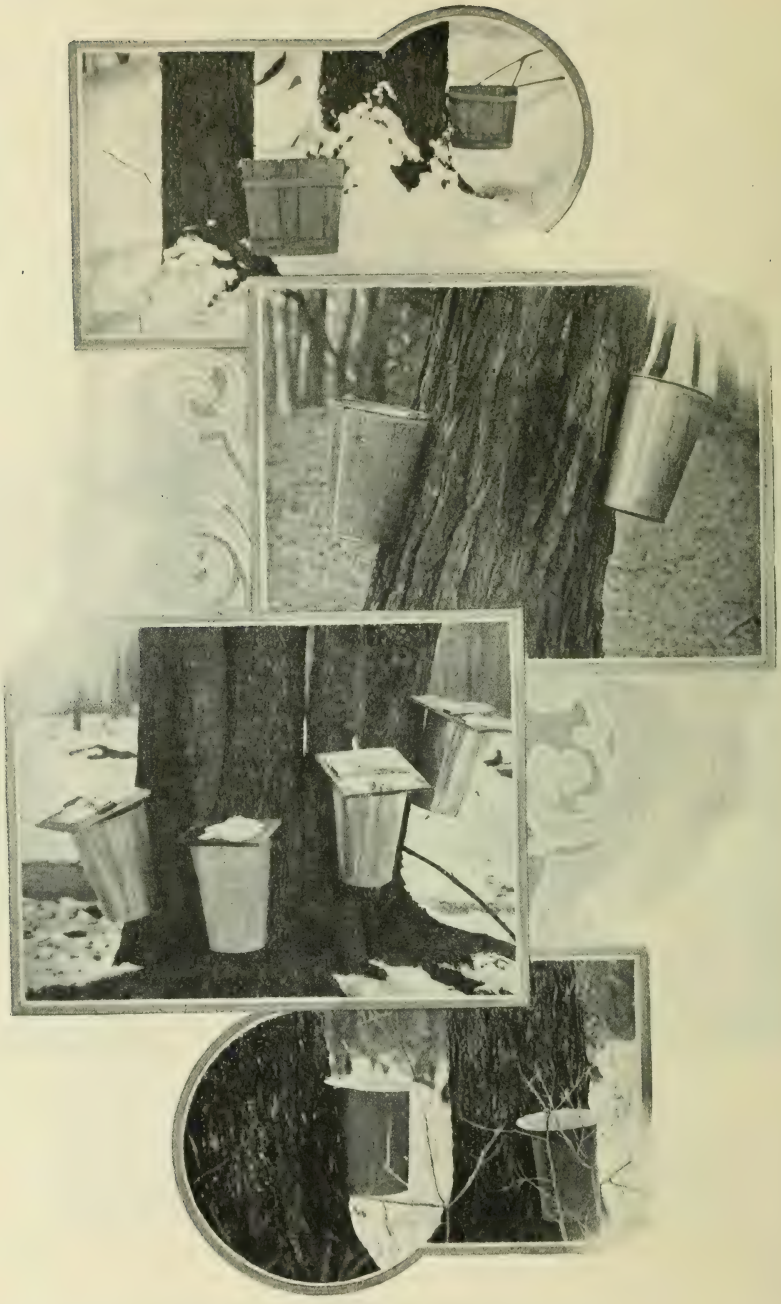

FIG. 17. SAP BUCKETS RECEIVING THE RUN

The wooden bucket shown in the uppermost scene is no longer used by the careful maker. The lower scenes show wooden and metal bucket covers.

this period the earliest tapping date was in 1894, when it commenced on March 9th. The latest season was in 1912, when tapping did not take place until the 9th of April. In 1903 the season ended on April 2, and in 1911 on April 26, which were the earliest and latest finishing dates on this farm.

At the beginning of the season all the sugar utensils should be cleaned, even though they were well washed, dried and stacked away at the close of the season before, for the dust which collects during the year would damage the first run of sap considerably. Utensils that have become rusty should be discarded or painted. If painted on the inside they should not be used before the following season, because freshly-painted buckets have a strong tendency to taint the sap.

Having distributed the buckets and spouts the tapping is begun. In the early days it was the custom to tap with an axe, then came the large auger which held sway for a long time as makers were slow to find out that as much sap could be secured from a small as from a large hole. Sap is forced out by internal pressure, and a very small opening will relieve that pressure, causing the sap to flow as rapidly as from a larger hole. If the tree is tapped again on the opposite side the pressure in another area is relieved and more sap is secured, but not twice as much. Another tapping will give still more sap in the aggregate, and so on, in a decreasing ratio.

As a general rule a tree is tapped at only one point, but it is not uncommon for a large tree to carry two vessels or even three, which is quite exceptional and not recommended.

Tapping is usually done with a three-eighths, seven-sixteenths or half-inch bit. The hole is bored in a slightly upward direction, about $1\frac{1}{2}$ inches deep in a medium-sized tree to 2 inches in a large one. The point of tapping should be about 30 inches from the ground, where the bark has a healthy look, and some distance from an old hole. Only the rough loose bits of bark should be removed from about the hole. The hole should be clean cut so as not to bruise or tear the wood or bark. All chips and bark should be carefully removed from the hole before inserting the spout.

Spouts

Many types of spile or spout are used but it is generally agreed that it should be of metal and of such material as will not corrode or prevent a free flow of sap. It should be perfectly round and slightly tapering so

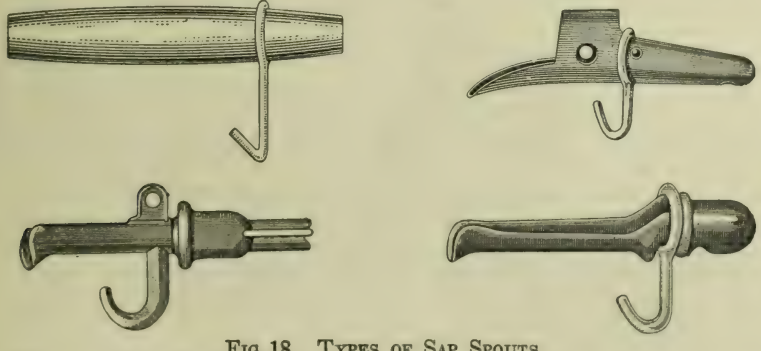

Fig. 18. Types of Sap Spouts

The upper left hand one is of wood; the others of metal. Wooden spouts are not in favour with the best makers.

as to fit the hole so firmly as to hold a full bucket of sap suspended from it. The spout should exclude the air from the hole as far as practicable so as to guard against drying up or the retention of sap to sour during a warm spell or freeze when it is cold. The inlet for the sap should therefore be near the bottom of the spout so as to drain completely at each cessation of a day's flow.

Buckets

There are several kinds of buckets, but to make the very best sugar and syrup, as well as to exercise economy, one should use only tin buckets of good quality. Galvanized iron buckets should never be used, as they

Fig. 19. The Sap Gatherer Making His Round.
Note the yoke for carrying the pails.

discolour the sap, moreover being coated with poisonous metal-zinc and lead, they are obviously objectionable. They are very difficult, in fact almost impossible, to repair when old, and are hard to keep clean. The only redeeming feature of a galvanized-iron bucket is that it will not readily rust. Many people still cling to the old-fashioned wooden buckets, but they tend to discolour and sour the sap and injure the tree, requiring an extra spike driven into it to hold the bucket. They are also difficult to keep clean and when handling may fall to pieces. A painstaking maker claimed to have used for forty years a set of wooden buckets and made good sugar, but he took the precaution of painting them inside and out every few years. New wooden buckets are now a thing of the past.

Because sap should be gathered frequently a very large bucket is not necessary. From 8 to 12 quarts is the usual range, the largest size being necessary only for trees farthest from the house, where the gatherer is likely to miss occasionally.

Covers

The bucket cover is by no means a new thing, but Canadian sugar makers have been slow to adopt it. In sections of Vermont covers have been in constant use for more than twenty years, but comparatively few Canadians have seen fit to put them on. In seasons of little storm during the making season covers may not be necessary, but after the spring of 1913, in which March was a stormy month, every one will admit the value of bucket lids. One farmer with a thousand trees tapped made 600 pounds of sugar, while his neighbour, running an equally large plant, poured out every particle of sap during the same period because he had no covers. Another without covers got only 90 pounds of sugar from 290 pails of sap and storm water that should, if pure sap, have yielded 290 pounds. Besides having to use three times as much fuel as should have been necessary, his sugar was dark, poor stuff, due to long boiling and washings from trees. Covers not only keep out storm but also bits of bark, moss, leaves and dead insects that are constantly being driven about whenever the wind is blowing. Covers are made of tin and of wood; illustrations of both kinds are shown at Fig. 17. The cover should not lie flat on the pail, but allow for an air space between the cover and the top of the bucket so as to ventilate the latter and thus avoid souring the sap. Taking one season with another covers pay for themselves in a few years. In certain counties of Western Ontario covers have been in use for several years and most of the makers now have them. These men from their comparatively small groves make goods of excellent quality, for which they secure very good prices.

As the season advances and the days become warmer fermentation is sure to take place in the vessels, causing the sap to sour and slime to accumulate about the spouts, buckets, pails and tanks. To continue making a fine product it is necessary to draw the spouts and ream out the holes so as to expose a fresh surface of wood. Some recommend boring a new hole a few inches from the old one and claim to get better results. At this stage all utensils should be scalded or washed with hot water. By carrying out these precautionary measures the season may be prolonged without risk of making " buddy " products.

The Vermont Agricultural Experiment Station has published a bulletin of 600 pages describing studies made by the officers of the Station on the influence of micro-organisms in spoiling sap. They conclude that although there is really no such a thing as "buddy sap," that is to say sap the flavour of which has been injured by the physiological changes occurring in the tree as it resumes its summer activity, yet most of what is called " buddy sap " is really sap spoiled by micro-organisms, which find conditions particularly favourable to their growth during the warm weather toward the end of the sugar season.

Gathering the Sap

The sooner the sap is turned into syrup or sugar the better will be the product. Sap deteriorates very quickly after it leaves the tree. For this reason gathering should commence as soon as there is a quart or two in the buckets.

Gathering pails for carrying the sap from the trees to the tank are frequently of wood, but heavy tin is better because it is more easily kept clean. For convenience in carrying sap these pails should have wide bottoms and narrower tops.

The tank for hauling the sap to the sugar house is mounted on a wooden shod sled. A rectangular hauling tank is not to be recommended because the sap dashing from end to end while driving over rough ground soon racks it to pieces. For this reason it should be circular in form and made of heavy tin or galvanized iron, with a reinforced wooden bottom. A tank holding from 75 to 100 gallons is a convenient size for a 1,000 tree grove.

The outlet at the bottom should be from two to three inches in diameter, so as to let the sap out quickly. A length of cotton hose or piece of pipe a little longer than the height of the tank should be fitted into the outlet. When gathering, this hose or pipe can be fastened to a hook in the top of the tank. To empty the tank let down the pipe and insert it into the pipe leading to the storage tank.

Fig. 20. The Hand Sled and Milk Cans Used in Gathering Sap

A double cloth strainer should be fastened over the entire tank to keep out all dirt. This cloth should be thoroughly cleansed after each gathering. It is well also to again strain the sap through two or three plies of cloth as it leaves the gathering tank for the storage vat.

If the sap could run directly from the tree to the evaporator the ideal condition would obtain, but obvious obstacles prevent this desirable result. A storage tank is necessary to keep the evaporator going between loads of sap. Because stored sap quickly deteriorates a large storage is not necessary, that is provided a sufficiently large evaporator is used. In order to keep the sap cool this vat should stand under a roof on the north side of the sugar house. In a warm time it is well to have a supply of ice to place in the sap to keep it cold.

The sap holder should be of heavy tin plate supported by an iron or wood frame. As already pointed out, it should be placed high enough to drain into the evaporator.

A Supply of Fuel

A proper supply of fuel is a matter of the utmost importance in sugar making. A quick flashing blaze is necessary to rapid boiling, and this can be obtained only with dry fuel. Wood is used almost universally, but in some cases coal is utilized to help out. Makers near the saw mills find great satisfaction in the use of slabs. Whatever wood is used should be cut the previous winter, piled out of doors during the summer to dry well and stored, before autumn rains commence, in the wood shed adjoining the sugar house. Split hard wood and small brush go well together, the latter to keep the blaze bright and lively.

Fig. 21. View of Inside of Sugar House

The amount of fuel that will be needed depends upon its kind and dryness. Ten cords of mixed hard and soft wood for 1,000 trees, or 35 cords for 4,000 trees are recommended by experienced makers.

Boiling the Sap

As soon as sufficient sap has been gathered to keep the evaporator in operation, preparation should be made for boiling. To hold sap for an unnecessary length of time in the storage tank is to lower the quality of the product. Before starting the fire enough sap should be run into the pan to cover the bottom to a depth of from one-quarter to half an inch above the corrugations. The shallower the sap in the pan the more rapidly will the sap be converted into syrup and the better the product. Fresh

sap boiled immediately in glass vessels gives a light coloured, delicate flavoured syrup, but if the syrup is diluted with water and again thickened by further boiling, the colour becomes darker and darker and the flavour stronger and stronger the more times it is diluetd and concentrated. The same undesirable result is obtained by boiling the sap deeply in the pan as this keeps the sap longer over the fire as was done in the days of the old time potash kettle.

For rapid boiling part of the wood should be cut short enough to go across the fire-box. When firing it is well it lay a stick crosswise at each end and then lay a single layer of wood on the top of these sticks; then another pair crosswise and another layer on top, continuing until the box is within about 8 inches of being full, then close the doors. The fire-box should be deep enough and the wood fine enough to allow for three or four tiers of wood and still leave space under the pan. This is important, as it allows the fire to roll over and over, giving off the utmost heat to the pan. In firing the fuel should be thrown in very rapidly so as to keep the doors open as short a time as possible, as the inrush of cold air when the doors are open quickly cools the pan and delays the evaporation.

The nature of maple sap is such that by boiling there is a natural cleansing of the product. A coagulation of albuminous matter first occurs and this rises as a scum bringing with it other solid matter. As all sugar makers are aware, it is highly important that this scum be removed as it forms by means of a skimmer which resembles an ordinary house dust-pan, having a somewhat longer handle and perforated bottom.

After boiling has proceeded for a time the depositing of mineral matter variously known as sugar sand, silica, malate of lime and nitre, commences.

This comes about by a concentration of the mineral salts to a point when they will no longer remain in solution. By the time the syrup has reached a consistency to be drawn off much of this mineral product has become a sediment and can be taken out by straining the hot syrup through a strainer of felt or several thicknesses of flannel. Makers of

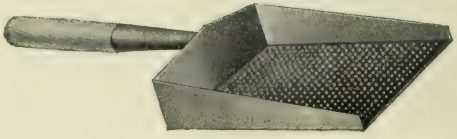

Fig. 22. Skimmer for Removing Scum from Boiling Sap

syrup resort to other means of removing this sediment, the addition of such agents as white of eggs, milk, baking soda, etc., being the principal methods. An old sugar maker considers that one egg or one-half pint of milk is sufficient to cleanse twenty to twenty-five pounds of sugar. It is a question whether or not these and similar substances when added to syrup do not injure the keeping quality. The more advanced makers are finding out that these are not so necessary as they were thought to be. By the use of cleanly methods and the proper handling of a modern equipment which includes felt strainers the goods are turned out pure and of good keeping quality.

Syrup

The syruping off point is a delicate one upon which the greatest care must be exercised. If not heavy enough the syrup will sour, and if too

heavy it will crystallize in the storage vessel. With careful work and the use of the thermometer or saccharometer it can be determined with accuracy. If the work is to be completed in the evaporator the syrup should be drawn quite frequently from the final compartment as it reaches the proper consistency. Continuous drawing off would be the ideal system but good results are achieved by removing the syrup at 10 to 15 minute intervals. Many makers prefer to use a separate arch and pan for finishing the syrup. In such cases the syrup is drawn from the evaporator before the final density is reached. Uniform density can be maintained more easily in this way and by having an extra pan the sugar maker may always have a clean one in readiness and by turning a damper in the arch it can be adjusted without trouble from smoke or ashes. The nitre-coated pan can easily be cleaned by keeping it under running water for a while or by allowing sour milk to stand in it over night and thoroughly washing and scalding in the morning.

To be exact, some sugar makers take the density of the syrup by means of an aerometer or densimeter. There are several kinds of aerometer, each graduated in a different manner, but the one most generally used is the Beaume. It includes a tube in the interior of which is a graduated scale, ranging from 0 degree to 50 degrees. The density is determined by the water line of the aerometer. At a temperature of 60 degrees F. the aerometer should stop in the syrup at 35·5 degrees. It should be noted that the liquid takes on a convex shape when it comes into contact with the side of the container or of the aerometer. The degree which should be read on the instrument is that which is in line with the surface of the liquid as indicated in Fig. 25.

Testing the Density

Most Canadian makers use the thermometer for judging when the syrup has reached the correct density. The boiling point of liquids varies with their density and with the altitude above sea level. At sea level water boils at 212, syrup at 219, soft sugar at 238 to 240 and hard sugar at 242 to 245 deg. Fahr. The boiling point for each of these is lowered one degree for about 550 feet ascent. Since sugar groves are usually at some height above sea level it is necessary for accuracy to test the thermometer in boiling water. At whatever degree the water boils there should be added for syrup 7 degrees, for soft sugar 26 to 28 degrees and for hard sugar 30 to 33 degrees. If, therefore, water boils at 210 degrees the syruping temperature would be 217, the soft sugar temperature 236 to 238, and the hard sugar temperature 240 to 243 degrees each in a state of boiling. Consequently when the boiling syrup reaches these respective figures on the thermometer it is sufficiently dense to be drawn off for the purpose desired.

The saccharometer or hydrometer is used for testing the density of the syrup either hot or cold. For testing boiling syrup the liquid is poured into a vessel two inches in diameter and nine inches deep and the saccharometer promptly placed therein. When the syrup is of standard weight the instrument will register 30½ degrees. If it registers less the syrup is too light and if more too heavy. In cold syrup of proper density, at say 70 degrees, the saccharometer should settle to 35½ degrees. Before making either the hot or cold test the instrument should be brought to approximately the same temperature as the syrup to be tested. In making syrup the use of an instrument is necessary for accuracy but

for sugar making experienced men can readily determine by observation when the correct density is reached for removing from the fire.

Syrup is not poured directly from the finishing vat to the marketing vessel but is placed to cool in a settling can. This is a heavy tin vessel

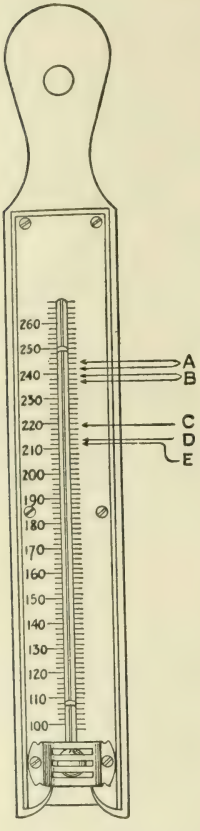

Fig. 23. Thermometer

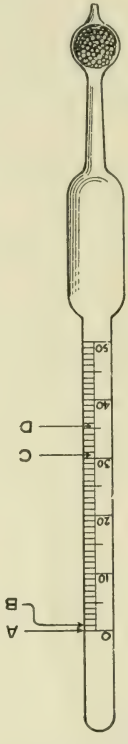

Fig. 24. Saccharometer

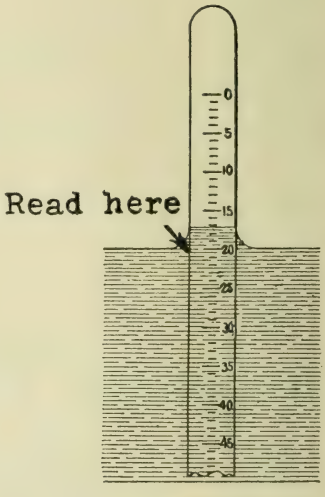

Fig. 25. Aerometer

In Fig. 23 A indicates the boiling temperature for hard sugar; B for soft sugar; C for standard syrup; D for sap, and E for water, all at sea level.

In Fig. 24 A indicates level when floating in water; B in sap; C in hot syrup, and D in cold syrup.

Fig. 25 represents an aerometer resting in the syrup. The arrow shows the point where the reading should be made.

supported by iron hoops and holding about 25 gallons. It has a faucet placed three or four inches from the bottom to allow any remaining nitre to settle before the syrup is drawn off to be canned.

Sugar

After the syrup has been properly settled the clear fluid is poured off through a felt filter or other strainer into a " sugaring off " pan and then placed on an arch or stove, and boiled until it reaches a granulated state

hard enough to cake into sugar. This granulated state can be ascertained by various methods. One is by the thermometer as already described. Another is by dropping a little of the boiling syrup into a cup of cold water, and if this forms itself into a hard lump at the bottom of the cup it is boiled sufficiently; but if it spreads over the bottom of the cup it requires more boiling. A third plan is to pour a little boiling syrup on packed snow or ice; if it hardens so as to crack under pressure it is boiled enough but should it run into the snow more boiling is needed. After the operator is certain that the sugaring state has been reached the pan is removed from the fire and allowed to slowly cool until it begins to thicken when it is poured into small tins for caking. For soft or tub sugar less boiling is required.

Because maple sugar is usually made into hard blocks it may not be generally known that it can be finished in a granulated or pulverized state. When the syrup is boiled to the temperature of 240 to 242 degrees, it will hardly make a medium hard sugar. When stirred sufficient to make the desired grain, it can be poured into the moulds, and by continuous stirring the sugar will granulate and form what is called " stirred " sugar. This sugar when dried out thoroughly may be pulverized which would make it almost as fine as flour, and if of good quality almost as white. In doing this one has to observe great caution to prevent the sugar from scorching when drying.

In boiling syrup, more especially as it approaches the finishing point, the liquid has a great tendency to rise and froth in the pan, and if not watched very carefully at times it flows over the sides. All sugar makers are familiar with this characteristic and with a means of combating it. In the days of the old iron kettle it was a rule to suspend a piece of fat pork a few inches above the normal boiling level. When the rising syrup touched the fat it immediately subsided. Even yet this time honoured custom is followed and when the pork is clean no serious objection can be taken to it. Unfortunately, however, all makers are not particular about the quality of the oil or fat they use, as lard and frying fats are made use of in some camps. These, it need hardly be pointed out, tend to impart an undesirable flavour. In every case a very small quantity of an oily substance is sufficient to quiet the frothing mass and nothing will accomplish it more effectively than a bit of good butter or a few drops of sweet cream, neither of which will impart an undesirable flavour.

Cleaning the Pans

At the conclusion of each day's boiling the evaporator pans should be removed from the arch and thoroughly cleansed, washing all scorched sugar, scum and nitre from the bottom of the syrup pan, and also sweeping from the bottom of the pan and between the corrugations all accumulations of soot. A convenient apparatus for removing the evaporator is a set of pulleys attached to an overhead truck running on a track crosswise of the arch. Through one of these pulleys a rope or chain is run, this is dropped down and hooked on to the sides of the evaporator pan. By arranging these for both ends of the pan it can be easily suspended and moved to the side of the building to be cleaned.

Canning Maple Syrup

The question of canning maple syrup hot or cold has been discussed by many of the best sugar makers in Canada, with an opinion about equally divided as to the better method. Under these circumstances it has been deemed advisable to outline the two methods, and leave it with the producer to decide.

The fact that a gallon of hot syrup does not make a gallon when cold is in favour of cold canning. To illustrate, a gallon can filled with hot syrup, boiled at a temperature of 219 deg. will not weigh more than 12½ pounds, whereas the same can filled with cold syrup will weigh 13 pounds 2 ounces net. The objection to canning at high temperature is that after the can has been filled the syrup as it cools will shrink, and allow a vacuum to form above the syrup. This is objectionable because it may result in the quality of the syrup being impaired either by fermentation

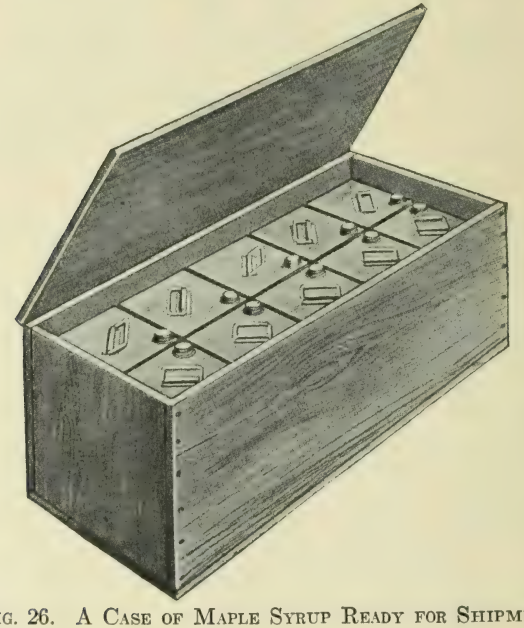

Fig. 26. A Case of Maple Syrup Ready for Shipment

or crystallization and besides the purchaser may feel that he has been defrauded in not getting a full gallon of syrup. It is, therefore, safer to can syrup cold, or at a temperature not higher than 100 deg. Fahr. Canning in either of these forms should take place only after the syrup has been thoroughly strained and allowed to settle for some hours until transparent and quite free from cloudy appearance.

Before filling the syrup cans should be thoroughly rinsed with boiling water, so as to remove the taint from rosin and acid used in soldering. Draw the syrup from the settling tank into the cans for market, and allow ample time for all bubbles of air to break up and come to the surface, then pour in more and make sure that the can is actually full by tipping slightly so that the mouth is the highest point. Fill up with syrup to the top of the neck and screw on the cap lightly (only lightly). If square or oblong cans are used press against the side of the can with the

hand so as to drive out all air, and when syrup is visible around this screw cap, screw it down firmly with the pressure of the hand still on the can. The can is thus full from top to bottom, and the syrup if of proper density will keep indefinitely.

If round cans are used, instead of pressing the sides of the can with the hand to force out all air, as is practised with square or oblong cans, take hold of the handle and raise the can and fill the can to the top of the neck or screw cap, then screw on the cap perfectly tight while the can is still suspended by the handle.

Syrup cans should be made from a good quality of tin. A square or oblong can is preferable, as being more easily packed, less liable to leak, has expansion to allow the syrup to change with the temperature of the weather, and when labelled has a better appearance. For shipment cans should be packed in boxes and in crates. It often happens that a package of syrup is left lying around, and the cans in crates get dirty, which hinders their ready sale. When packed in a tight box they are kept clean and when exposed for sale present a good appearance. The size of the can depends on the market; gallon and half-gallon are probably the best sellers.

A good label placed on the cases of syrup or packages of sugar, with the purity of the article distinctly declared on it, with the name and address of the packer or producer shown, should give confidence to the purchaser, and is an assurance to the latter that what he is getting is genuine and above suspicion. The purchaser cannot be blamed if he is suspicious of goods that are put up without such labels.

Storing Syrup and Sugar

If syrup is of proper consistency and is canned as directed in a foregoing paragraph it will keep from one season to another without deterioration. The storage temperature should be cool and fairly uniform, but not near the freezing point, as then it tends to crystallize.

Maple sugar does not keep well in a moist atmosphere. It tends to absorb water and moulds readily, more especially if it has been finished at too low a temperature. Maple sugar, therefore, to keep well in storage, should be boiled at a high temperature. After being taken from the moulds it may be wrapped in parchment paper, but should not be put in covered containers unless sealed air-tight. In such containers it may be stored in a cold place that is dry, but otherwise a dry, warm, even temperature is best.

Putting Away Utensils

At the end of the season all utensils should be thoroughly washed and cleansed with hot water, and packed away carefully during the summer in an absolutely dry place. Owing to the dampness in houses built in heavily-timbered groves it is often impossible to utilize the house for storage purposes; in that event they should be removed to some dry and tight building, outside the bush. The buckets should be corded up one on top of the other, instead of nested, as packing closely together is injurious in a moist air or during wet weather. If for lack of space they cannot be corded, they should be nested only after being thoroughly dried by placing on the sides for an hour or two in the hot sun.

MARKETING

Maple syrup and sugar can hardly be considered at the present day as products of general commerce as are white sugar, tea, flour, or the like, which enter into the regular household economy of the average family. Indeed it is safe to infer that thousands of Canadian families know nothing of these products although some of them may have bought for the first and last time a compound or a flavoured sugar bearing a name or design suggestive of the Canadian emblem. Genuine maple products of fine quality have entered the class of luxuries that are called for more and more as people become better off. Because maple sugar possesses a distinctively delicious flavour and is therefore in more or less demand, more particularly during the spring months, the candy maker has sought in various ways to produce from cheap sugars compounds to take its place. Such mixtures are usually composed of cane sugar and glucose, to which has been added a greater or less quantity of strong flavoured, low grade maple sugar or, worse than that, an extract made from coal tar or other substances designed to impart a "maple" flavour. These substances unfortunately not only supplant the genuine maple goods but they do not for long satisfy the palate, and when taken for the sugar they seek to imitate, tend to drive away a customer from the genuine goods. In this way imitation sugars are more injurious to the industry than maple sugar of poor quality, which can always be sold to the confectioner at a price that appears to satisfy the indifferent maker. Indeed it is a remarkable fact that even the better class of grocery stores are able to handle considerable quantities of very indifferent sugar. So long as it is genuine, people will use more or less of it as an annual treat. All purchasers are not satisfied with a dark, strong sugar, but want a better grade, which can always be depended on to bring a higher price. Occasionally the very best grocery stores display really first-class maple products to supply discriminating customers who are willing to pay the extra price which is always demanded for them.

It is not through the regular commercial channels that the first grades of maple sugar command the highest prices. The private customer is the best outlet for the superior article of which the wide-awake maker seldom has enough to go around.

After one has taken the pains to make a first-class product, it is worth his while to seek out the best paying customers. A thousand-tree maker in Compton county, Quebec, who covers his buckets and takes every other reasonable precaution to make fine goods, sells practically every pound he makes in local towns and the city of Sherbrooke. At first a little peddling was necessary, but the quality of his goods and generous measure acquired a reputation that spread to an ever widening circle.

BY-PRODUCTS OF SUGAR MAKING

In the process of making maple sugar and syrup two by-products are obtained from which a considerable revenue might be secured. These are maple vinegar and sugar sand.

Vinegar

It is estimated by an experienced sugar maker that from the product of 1,000 tapped trees one may easily make from 25 to 30 gallons of very fine vinegar from materials that are usually thrown away. To this may be added in some seasons a considerable quantity of late " buddy " sap that will not make good sugar. While making is in progress one should have at hand a barrel into which is poured the washings and drainings of all sugar utensils, including the strainers, pans, etc. By the end of the season the quantity thus saved will amount to a good many gallons.

If kept moderately cool (about 50 degrees F.) alcoholic fermentation, the first essential stage in the making of vinegar, will probably take place spontaneously in the barrel. It is better, however, to make the fermentation sure by putting in a little yeast. A cake or two of compressed yeast will serve the purpose well, or table raisins may be used.

When the alcoholic fermentation (which will usually require about two weeks) is completed, the contents of the barrel should be carefully strained into a vinegar barrel. A small quantity of good " mother of vinegar," or some old vinegar, or both, should then be added and the barrel should be set on its side in a warm room, about 70 degrees F.

The " mother of vinegar " is the slimy skin which forms on the surface of the vinegar. It consists of a mass of the bacteria which convert alcohol into acetic acid, the characteristic acid of vinegar.

The vinegar added to the barrel may best amount to about one-tenth the volume of the alcoholic liquid. Care should be taken to free this vinegar from vinegar eels and vinegar flies. This can be done by straining through bolting cloth, flannel, or felt.

Two conditions favouring the production of vinegar are warmth and a free supply of air. To secure good results the half-full barrel should be laid on its side in a warm room and have bung holes opened at both ends so as to allow a free draught of air above the liquid. To exclude the vinegar fly the bung holes must be protected with either muslin or cotton-wool, which must be kept dry, or with a fine varnished metal screen.

Sap to be made into vinegar should be boiled down to about one-seventh its bulk and then treated as already described for the washings of sugar plant utensils.

Where vinegar is made on a large scale, for instance by dealers in maple products, the process can be hastened by allowing the alcoholic liquid to drip slowly through a barrel of clean beech shavings which have been impregnated with warm vinegar to inoculate them with the acetic acid bacteria.

In flavour maple vinegar is much superior to most of the commercial varieties and it is regrettable that it is not more generally used. Much of the vinegar on sale in Canada as " white wine vinegar " is made in distilleries from pure alcohol and should properly be called "spirit vinegar." This, while perfectly wholesome, is of poor flavour as compared with maple vinegar, cider vinegar or malt vinegar.

Sugar Sand

" Sugar sand " (also inaptly called " nitre ") is a by-product of potential value. This is a sediment which separates from the sap as it attains the consistency of syrup. It has been shown to consist mainly of malate of lime and to be an economical source of malic acid. This acid which takes its name from the apple (Latin, malum), is found in small quantities in many fruits, but the pure acid can be much more readily prepared from maple sugar sand than from fruit juices. The acid is a wholesome flavouring agent for food products. A substitute, known as inactive malic acid, is manufactured from coal tar benzene, and as this serves most of the purposes of the natural product and can be made more cheaply, the demand for the natural (" active ") acid is very limited. However, small quantities are manufactured from maple sugar sand, and there is a little demand for this by-product of the maple sap industry.

Sugar sand gathers in the felt and flannel strainers through which the hot syrup is filtered and what escapes these strainers settles as a sediment below the faucet of the settling syrup cans. An extensive sugar maker estimates that a thousand-tree grove should yield from 40 to 50 pounds of sugar sand in a season. The yield varies greatly from year to year.

In preparing sugar sand for market it has to be thoroughly washed and rinsed with hot water, or hot sap, in order to take out the sugar. It must then be spread out on cotton or paper to dry. The washing can be carried out in the felt strainer. The wash water may be boiled down to syrup or used for vinegar making.

Moist sugar sand quickly spoils, but the thoroughly dried product may be kept for years. For what little sugar sand has been purchased, prices approximating those current for maple sugar have been paid.

A MAPLE SYRUP AND SUGAR MAKERS' ASSOCIATION

An association has been organized with headquarters at the Department of Agriculture, Quebec, Que., known as the Maple Syrup and Sugar Makers' Association of Canada. The new association replaces the association organized in 1913, under the name of the Pure Maple Sugar and Syrup Co-operative Agricultural Association. The object of the association is to improve the product and to promote sales.

The officers are: patrons, hon. president, a president, vice-president, five directors, associate directors and a secretary-treasurer. Any person may become a member by paying an annual fee of one dollar. The president is the Hon. Gustave Boyer, Rigaud, Que., and the secretary-treasurer, Mr. C. Vaillancourt, Department of Agriculture, Quebec, Que.

The goods marketed by the Maple Syrup and Sugar Makers' Association are handled at comparatively little expense and very satisfactory prices obtained. The association uses a distinctive label which is calculated to be a guarantee of genuineness. Members can obtain a supply of these from the secretary.

Maple sugar makers wherever in Canada they may be situated will do well to associate themselves with this co-operative movement which should do much to build up and greatly improve an industry that for a number of years showed indisputable signs of decline.

The Benefits of Organization

At the meeting at which the Pure Maple Sugar and Syrup Co-operative Agricultural Association was organized, Mr. A. A. Carleton, President of the Vermont Maple Sugar Association, delivered an address on the benefits of organization. The Vermont association has been in operation for twenty years and has therefore valuable lessons for Canadian sugar makers. Following is Mr. Carleton's address in abridged form:—

The benefits of an association, when backed by the government and good legislation, are numerous and a great help to the producer as well as the consumer. "In union is strength," therefore by uniting our minds, wills, and personal push in an association we are bound to further the cause for which it is formed. I consider the circumstances which beset you farmers are similar to those which we people of Vermont have had to contend with. As the demand for our maple products has increased, the "mixers" have also increased their output, although the amount of pure maple goods remained the same.

By strenuous efforts on the part of the sugar makers, as an organized association and backed by the Government of Vermont, we have now a "pure food and drug law" which strictly prohibits the adulteration and misbranding of food products, including maple sugar and syrup.

The association issues a protected label to its members free, upon their agreement, filed with the secretary, that they will use it only upon packages containing pure maple sugar and syrup of standard quality and of their own manufacture. Any improper or unauthorized use of this label or any adulteration of the products covered by the same, will be prosecuted by the association to the full extent of the law. The penalty is not less than $50 or more than $200 for each offence. One-half of the fine goes to the complainant.

Has the passage of this act aided the Vermont farmer and the maple sugar industry or will like legislation better the prospects of the farmer and the maple industry of Canada? I will answer both questions alike. Yes. If something had not been done to prevent the decrease in our maple product, in a few years it would probably have passed out of existence.

I know you, as well as we of Vermont, have had discouraging circumstances to deal with. Why has not the production of pure maple sugar increased with the demand? First the increase has been met by the mixer; the farmer is discouraged, he can not make the pure maple sugar of No. 1 quality and compete with the spurious article of the mixer at the price the latter is placed on the market, when labeled as pure maple sugar, when in reality but a small per cent, if any of it, ever came from a maple tree. The securing of labour has been a severe problem with us in Vermont, but the most lamentable and inexcusable part of the whole industry is the production of a poor grade of sugar which is fit only for the mixer, tobacco factories and the distillers of liquor. The prices paid were so low that the farmer received poor remuneration for his labour, causing him to stop making and in many cases being short of ready money, he has cut down the old sugar place which was the pride of generations. The timber has been sold to the ever greedy mill, but a wrong has been committed which succeeding generations cannot repair.

When we consider the fact that the little State of Vermont, with only 10,200 square miles, has a yearly income of $1,086,933 from her maple products, we realize the industry is worth fighting for. I seem to see two classes of maple sugar makers, one class labouring as of old, with the same old notions, and following the same old methods, while the others comprehend that they are manufacturing an article which is used as a luxury and not as a commercial commodity. This latter class use their best endeavours to perfect their goods. The former are working under difficulties, while the latter are getting abundant returns for their labour.

We as American maple sugar makers must control our sugar product and place it in the hands of the consumer. First, it pays better to do so and second, it insures purity. We know how the pounds multiply as they pass through other hands in our large cities. It is a duty we owe ourselves, our nation and our customers that we provide some means whereby sugar may reach its ultimate destination in the pure state it leaves the camp and that the consumer and producer may be protected and thereby share in the profits of the speculator and the middleman. In Vermont more new up-to-date sugar-making apparatus and equipments have been installed in the past five years than ever before in the history of the industry. What has made the change? The "pure food law," faithfully enforced and the work of our association. Our state appropriates $500 yearly for the Maple Sugar Makers' Association, to use in increasing, promoting, and advertising the maple sugar industry in the state and so assisting the farmer to increase his income. Never before in the history of Vermont were the prospects of the sugar maker brighter than to-day. People are alive to the fact that quality counts. As the purchasing public become alive to the quality of fine, pure goods and as makers learn to manipulate their plants so as to turn out choice products there will be less and less of the strong, black kind made that will bring only an inferior price.

The wealth of the world is for those who can get it, let us get ours in a legitimate way by drawing from the people of wealth our share of their income, which they gladly spend to secure luxuries of quality and purity.

MAPLE SUGAR SCHOOLS

Commencing in 1914 the Quebec Department of Agriculture has carried on systematic instruction in the manufacture of maple sugar and syrup. This work has been carried on by funds provided by the Dominion

FIG. 27. STUDENTS GATHERING SAP AT A SUGAR SCHOOL

Government, under The Agricultural Instruction Act, amounting to from $3,000 to $4,000 per year.

For a few years from three to four schools were operated in charge of skilled sugar makers. Owing to small attendance, the schools have been reduced to one at Ste-Louise with 5,600 trees that is used for the training of sugar experts, and carrying on experimental work. All of the schools were fitted with modern equipment. The instructions given include tapping, sap-gathering, and the various manipulations leading up to the finished syrup and sugar. The students assist with the work and receive their board and lodging.

Travelling instructors drawn from the students of the school, are employed to give practical instruction on sugar making throughout the province. Nine instructors employed in the spring of 1923 visited about fifteen hundred sugar making plants. On the authority of government officials connected with the industry, and dealers in maple tree products, the quality of sugar and syrup produced in the province is year by year improving.

A MAPLE PRODUCTS CONTEST

Primarily with the object of encouraging improvement in the methods of making maple syrup and sugar, and secondarily for the purpose of securing samples of No. 1 quality to be used in educating the public, Mr. John H. Grimm, of Montreal, a director of the Pure Maple Sugar and Syrup Co-operative Agricultural Association, conducted a maple syrup and sugar contest in which were awarded prizes amounting to five hundred dollars.

In judging the maximum points allowed were for syrup: flavour 60, colour 25, and body 15. Out of 513 contestants in the syrup section, 31

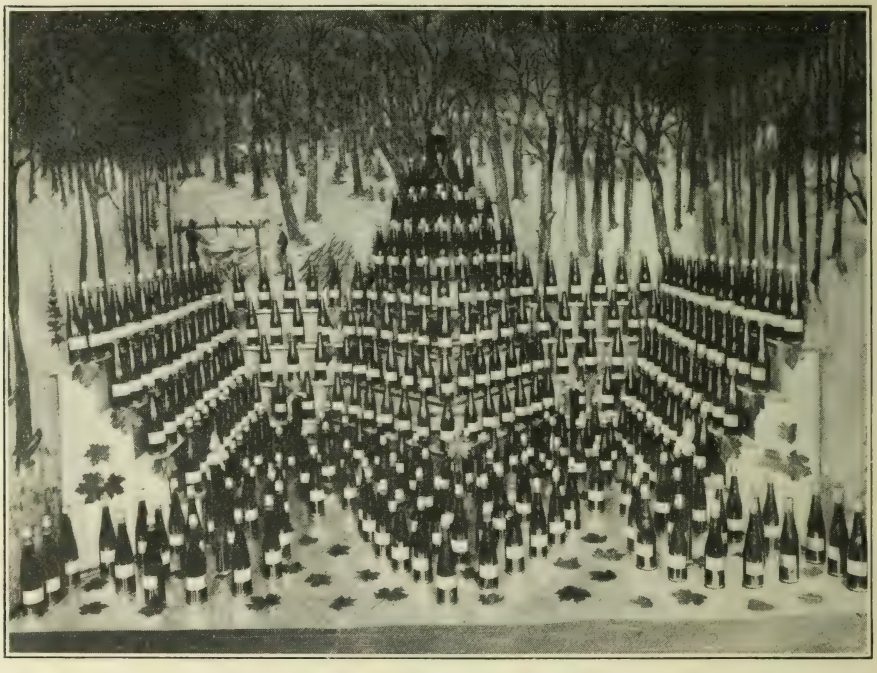

Fig. 28. Display of Competing Maple Syrup

scored 99 points. In judging the sugar, 60 points was allowed as a maximum for flavour, and 40 points for colour. Thirteen out of 233 contestants scored 99 points.

A second contest was carried out by Mr. Grimm, when $1,000 in prizes was offered. Scoring was done on the same basis as in the previous contest. The competing goods in both contests were brought together in Montreal and judged by Mr. C. H. Jones, chemist of the Vermont Agricultural College. In the latter contest forty-four per cent in the syrup section scored not less than 97 points out of 100. In the sugar section forty-eight per cent did equally well.

In these contests a number of important points are brought out. Contrary to the opinion that soft maple is not good for sugar making it is

shown that good syrup may be made from the sap of this variety. In a number of cases the prize-winning syrup was made from hard and soft maple trees.

About fifty-seven per cent of the groves were on rocky land, unfitted for cultivation, and about 25 per cent practically untillable. The character of the soil varied from rocky to clay and included clay loam and gravelly soils.

According to the judge the syrups scoring 99 points, and which were made in some cases hundreds of miles apart, were so nearly alike in colour and flavour as to give one the impression that they were all made by the same maker from the same grove. Practically the same remark applies to the sugars.

Fig. 29. Display of Competing Maple Sugar

How the Prize-Winning Goods were Made

In order to learn for the benefit of the readers of this bulletin how the prize-winning syrup and sugar were made a set of questions was sent to each successful contestant. From the replies received the following points are deducted:—

Spouts and vessels: All the prize winners use galvanized steel spouts of tapering form so as to be held by the bark, instead of being jammed against the sap wood, and to be easily withdrawn. The spout is so constructed as to exclude air from the bore. Most of the hauling and storage tanks are of galvanized iron. A number of makers expressed a preference for tinned tanks. The buckets used are chiefly of tin, many of them painted on the outside.

Covers: All the prize winners that replied use covers on their sap buckets. Some say that covers will pay for themselves in one season if at all stormy, as they keep out the rain and snow and washing from the trees, and save fuel and time of boiling and insure a lighter, better flavoured syrup.

Cleaning and care of sap utensils: Without an exception the pails and tanks are well washed and by many scalded at the close of the sugar season, thoroughly dried in the sunshine and stored upside down in dry, airy quarters. These, as well as the spouts, are again thoroughly washed at the beginning of the season and the tanks are washed two or three times during the sugar season, or as often as they appear to need it. Some makers make it a rule to wash out the tank at the end of each run of sap.

The evaporator: All makers use a modern evaporator having a corrugated bottom. Most of them clean the inside and brush the bottom free from soot after each boiling. In some cases where the sap is carefully strained makers find washing once in two or three days sufficient. All agree that the pan needs washing whenever it appears dirty on the sides. Some makers wash with hot sap, using a brush and cotton cloth. The use of sour sap, followed by clean washing, is recommended for removing nitre from the pan. One prize winner changed the position of the two back pans of the evaporator every morning, while another changed them at noon also.

Boiling the sap: All agree that sap deteriorates quickly, therefore, the sooner it is made up the better. Even in times of a slow run some of the successful makers gather and boil each day, while a few others consider that boiling once in two days may do in very cool weather, more especially if ice is used to keep the sap cold. For rapid boiling all recommended shallow boiling and the use of very dry, sound wood, finely cut. At least part of the wood should be soft, as it is more inflammable.

Finishing the syrup: In almost every case the prize-winning syrup was finished in the main evaporator. Reheating is claimed to darken the syrup. One maker drains off the syrup every five minutes at a temperature of 219 degrees.

Straining: Every maker who reported strains the sap once and the syrup once. Several of them strain the sap twice, once through a fine wire strainer in the gathering tank and once through a cotton strainer into the storage tank. Several strain the boiling syrup through felt strainers specially made for the purpose, while others use two or three plies of heavy flannel or blanketing.

Sugar: The prize winners agree that to make really fine sugar it is necessary to have choice, light-coloured syrup. This, after being strained through felt or flannel, should be boiled rapidly in not too large batches in a sugaring-off pan. If the sugar is for long keeping it is better to be finished with very little stirring and be put into the moulds hot. It then turns out hard and granular and will not leak. If, however, a less flinty sugar is wanted for early consumption it is better to stir it almost constantly while cooling. This will give a softer sugar that is easily cut with a knife. Some of the prize-winning sugar was of the semi-transparent, flinty kind, while others were of the more mellow consistency, but all were light in colour.

Packages: Makers who do a retail trade in syrup recommend half-gallon and gallon cans bearing an attractive label.

Additional considerations: Cleanliness and speed are given as the chief considerations in making a high-class product. That is to say, all vessels must be kept as clean as possible and the sap must be gathered frequently, strained thoroughly and boiled rapidly until finished. Long boiling or re-boiling darkens the syrup.

It was pointed out by several makers that the public require to be educated to recognize a first-class product of syrup and sugar. As consumers learn this they readily demand the better goods, for which they willingly pay a price corresponding with their value.

THE FUTURE OF THE INDUSTRY

The maple sugar industry has, during many years, shown an unmistakeable inclination to decline. The yearly production of sugar, together with its equivalent in syrup, fell from more than 22,000,000 pounds in the eighties of the past century to about 20,000,000 pounds during recent seasons. This is not to be wondered at, because, until quite recently, no organized effort had been made to keep it alive. The higher prices that have prevailed for the past few years are tending to increase the output of both sugar and syrup.

Grades of Maple Products

In order to ascertain, for the information of readers of this bulletin, how Canadian maple sugar and syrup grade, well-informed authorities who handle the great bulk of these goods in Canada were consulted. As a result the astonishing information was obtained that not more than 10 per cent of Canadian maple products grades No. 1, while 20 per cent grades No. 2, 20 per cent No. 3, and 50 per cent No. 4. That is to say, of the 20,000,000 pounds made each year, fully 10,000,000 pounds are of No. 4 grade, having a market value much below that of No. 1 goods.

Of this 10,000,000 pounds, practically none is marketable by the makers to private customers, while the much larger proportion of the 2,000,000 pounds of No. 1 grade, and more or less of the No. 2 and 3 grades, are sold direct to customers.

Only a small proportion of Canadian sugar makers secure the high price that fine goods command.

As pointed out by one of the successful competitors in the syrup competition, there is much to be done in educating the consumers in regard to quality of maple products. This will have to be accomplished partly through the eye, and partly by way of the palate.

Maple Sugar a Luxury

To show the appearance of the different grades, there are printed on page 2, figures 1 and 2 in natural colours, representing sugar and syrup of grades, 1, 2, 3 and 4. Samples from which these selections were made, were selected by an expert of wide experience.

The finest flavour in syrup and sugar are always found in the pale coloured goods represented in grades 1 and 2. It is invariably mild and very pleasing to the palate. In other words, the pale colour and delicate flavour are both the result of clean fresh sap, quickly boiled in a clean evaporator.

If all makers of maple products would fully realize that their sugar and syrup are articles of luxury, and make and put them up accordingly, there would undoubtedly grow up a tremendous demand for them, not only in Canada but in other countries. Great Britain is ready to take a liberal supply of choice goods. France also has learned the value of fine maple sugar and is already giving indication of a considerable demand. During the period of the war large quantities of maple sugar were distributed to the Canadian soldiers. Some of this, at least, was shared with the French people. This has created a demand among European

consumers for maple products. An inferior article has no chance of success with the better class consumer to whose taste it is intended to make an appeal. The day of the coarse, dark, unattractive block of sugar is over and the maker should now discern the fact that its production does not pay.

The preservation and development of the maple sugar industry means more to Canada than the annual production of a quantity of table sweets. It means the conservation and improvement of hundreds of thousands of acres of grove and forest trees of a variety of which every Canadian is proud. To vastly too great an extent the majestic maple has been cut away for the fire-place and the factory until, in many districts, once clothed with maple forest, there remains only a small number of road-side trees bearing the Canadian emblem. It could not be expected that the forest could be preserved on prime farming land, but there would seem to be little excuse for denuding great stretches of maple-clothed rocky soil, that when cleared is deprived of usefulness. A maple grove or forest is for its lumber and fuel an asset rapidly increasing in value, and when to these products there is added an annual crop of sugar of such fine quality as to constitute a luxury, it may fittingly be designated an orchard. When a maple grove merits, as that of no other forest tree can, the designation "orchard," it will have reached a plane on which it may rest with comparative safety. It would seem to be a duty, that might be regarded as a privilege, on the part of legislators, farmers, and all other classes of the community to do what they can to protect and otherwise encourage the maple sugar industry.

The future of the sugar maker seems bright with hope if he will but attach to his work that dignity which rightly belongs to it. Pure and fine products of the maple tree hold an enviable position among luxuries in the homes of well-to-do pepole, and will continue to increase in value. To secure the benefit of this advance the grower requires not only to furnish his plant with modern equipment, but he must exercise the utmost care, as does the maker of choice butter, in every stage of the process of manufacture. In doing this let him remember that he is one of a body of from fifty thousand to sixty thousand Canadian sugar makers that are aiming at the same gaol—the saving of a threatened industry, and he will accomplish much, not only for himself, but for succeeding generations. In this, as in all great enterprises, there is strength in union. The Maple Syrup and Sugar Makers' Association of Canada has an important work before it. Its interests are those of every farmer who taps a tree. Let him recognize this and give the organization his sympathy and support.